

SUMMARY

Flax (*Linum usitatissimum* L.) crop is grown in Egypt as a dual purpose type " fiber and seeds", and its yield and quality are affected by many factors such as varieties, microelements and seeding rates.

Therefore, this study was carried out to investigate the effect of those factors on growth, yield and quality of fibers in flax.

Two field experiments were carried out at El-Gemmeiza Agricultural Research Station, ARC in 1989/90 and 1990/91 seasons, to evaluate two promising flax strains, S. (19/31), "released as Giza 7", and S. (2419/1); grown under different microelement treatments and different seeding rates in relation to growth, yield and yield components, in addition to anatomical and quality characters.

A split-split plot design with four replications was carried out in both seasons, the main plots were devoted for the two strains. The sub-plots were assigned to the three microelement treatments i.e., zinc, cupper at 250 ppm concentration and untreated control and the sub-sub plots for the six seeding rates i.e., 750, 1000, 1250, 1500, 1750 and 2000 seeds/m².

The main findings of the present investigation could be summarized as follows:

A: Growth characters

1. S_1 (19/31) plants were taller than S_2 (2419/1) plants, particularly at the later stages of growth. Also, S_1 plants had higher technical stem length compared with S_2 ones.

No significant difference was detected with regard to dry weight per plant between the two strains. However, S_2 plants insignificantly outweighed S_1 plants at all stages of growth.

With regard to percentage of different plant organs to total dry weight it was observed that S_1 plants had higher stem dry weight percentage at fourth stage of growth, whereas S_2 plants recorded higher leaves dry weight percentage, but no significant difference was detected in roots dry weight percentage.

Also S_2 plants had higher number of upper branches and number of capsules per plant compared with S_1 plants.

2. Zinc application significantly increased plant height at all growth stages, stem dry weight percentage (at early stages of growth). Copper application increased leaves dry weight percentage at early and later stages of growth.

Microelements had no significant effects on technical stem length, dry weight per plant, roots dry weight per plant, number of upper branches per plant and number of capsules per plant.

3. Increasing seeding rate significantly increased plant height at all growth stages, technical stem length, stem dry weight percentage and significantly reduced dry weight per plant, leaves dry weight percentage, roots dry weight percentage at all growth stages, upper branches number per plant and number of capsules per plant.

4. Most of the interactions between the three experimental factors had no significant effects on growth characters. Exceptions were observed for the following interactions:

Strains x microelements on dry weight per plant after 75 days from planting, leaves dry weight percentage after 75 days and dry weight per plant after 115 days from planting in both seasons.

Strains x seeding rates on roots dry weight percentage after 115 days in the first season.

Microelements x seeding rate on technical stem length after 95 and 115 days from planting in both seasons.

B. Yield and yield components

I Straw yield and its related characters

1. S_1 (19/31) plants were significantly superior to S_2 (2419/1) plants with regard to technical stem length; and produced greater number of basal branches per plant and higher straw yield per plant and per feddan, whereas S_2 plants were higher in length of top capsules zone and stem diameter. S_1 outyielded S_2 in straw yield per feddan by 4.14 and 12.16% in the first and second season, respectively.
2. Zinc application insignificantly increased technical stem length. Also, Zn and Cu in general and Zn in particular insignificantly increased length of top capsule zone, stem diameter, number of basal branches per plant, straw yield per plant and per feddan.
3. Increasing seeding rate significantly increased technical stem length and straw yield per feddan, but significantly decreased length of top capsule zone, stem diameter, number of basal branches and straw yield per plant.
4. The effect of interactions between the experimental factors was only significant between:

strain x microelements on straw yield per feddan in the first season and among strains x microelements x seeding rates on straw yield per plant in both seasons.

II Seed yield and its related characters

1. S_2 (2419/1) plants were significantly superior to S_1 (19/31) with regard to number of capsules per plant, number of seeds per capsules and per plant, number of upper branches per plant, seed yield/plant and per feddan, and seed index.

Such results indicate the superiority of S_2 in seed production where it outyielded S_1 by 2.40 and 2.47% in the first and second season, respectively.

2. Microelements application had no significant effect on all seed yield components. However, slight and insignificant increases in seed yield and its components were observed due to Zn and Cu application.
3. Increasing seeding rates significantly reduced seed yield components. On the other hand, seed yield per feddan significantly increased as a result of increasing seeding rate. The seed yield per feddan was increased by about 58 kg per feddan

due to increasing seeding rate from 750 to 2000 seeds/m² in the two seasons.

4. The effect of the interaction between strains and seeding rates was only significant on number of capsules per plant in 1989/90 season.

Also, the second order interaction significantly affected number of capsules per plant (in the first season), number of seeds per plant (in the first season) and number of upper branches per plant in both seasons.

III Technological characters

1. S₁ (19/31) plants were significantly superior to S₂ (2419/1) plants in fiber yield per plant and per feddan, fiber length, long fiber percentage as well as fiber fineness. On the other hand, S₂ plants were significantly superior to S₁ plants with regard to oil percentage as well as oil yield per feddan.

S₁ outyielded S₂ in fiber yield per feddan by 24 and 29%, respectively, in the first and second season, whereas S₂ outyielded S₁ in oil yield by 7.5 and 7.8%, respectively in 1989/90 and 1990/91 seasons.

2. Zinc and copper application significantly increased fiber yield per feddan, fiber length, long fiber percentage, fiber fineness and oil yield per feddan. On the other hand, fiber yield per plant was significantly decreased with increasing seeding rate.
4. The second order interaction among strains, microelements and seeding rates had a significant effect on long fiber percentage in both seasons. Other interactions did not significantly affect technological characters.

C. Anatomical studies

1. S_1 (19/31) had higher values of fiber area, fiber ratio, fiber/xylem%, number of fiber cells per cross section and fiber index than S_2 (2419/1).
2. Microelements (Zn and Cu) favourably increased anatomical characters of plants compared with untreated ones.
3. Increasing seeding rates to 1500 or 2000 seeds/m² recorded the highest means of fiber area percentage, number of fiber cells per bundle and per cross section, fiber/xylem percentage and fiber index in both seasons.